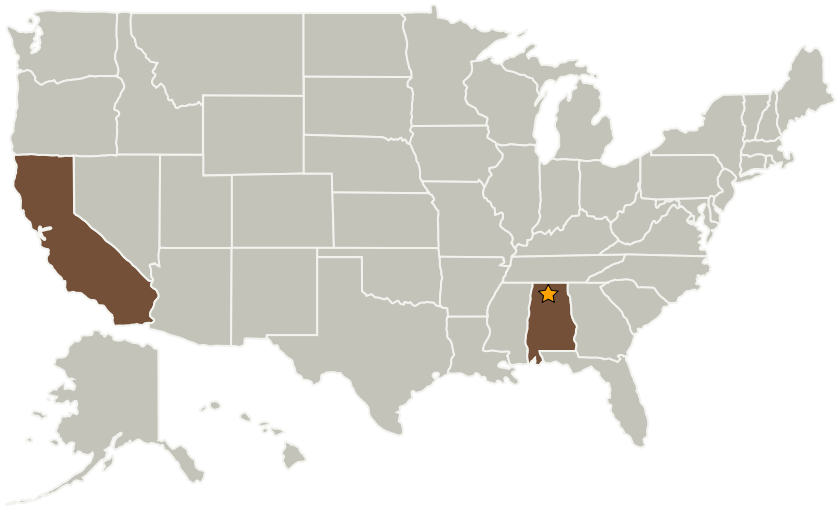
Rapid Damage-Free Shaping of Lightweight SiC Using Reactive Atom Plasma (RAP) Processing, Phase II

Completed Technology Project (2005 - 2007)

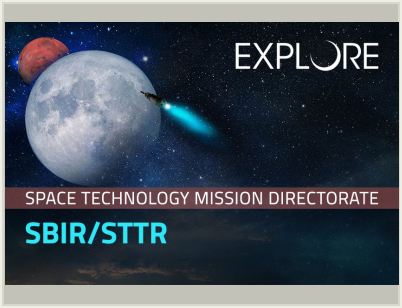
Project Introduction

The proposed Phase II effort seeks to demonstrate a dramatic reduction of the manufacturing cost and cycle time of lightweight silicon carbide mirrors by substituting a novel reactive atom plasma (RAP) process for traditional hard tool grinding and lapping. We will use the RAP process (a plasma-based non-contact shaping tool) along with conventional steps to shape a series of lightweight optics, culminating in a 12" asphere. We will finish these optics to final specification using one of several candidate sub-aperture finishing tools. The avoidance of surface and subsurface damage by the use of this non-contact RAP process is expected to substantially reduce the time and cost of optical finishing of lightweight SiC optics. We will also demonstrate the scalability of the RAP process for SiC optics and optical segments up to 2 meters.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
RAPT Industries, Inc.	Supporting Organization	Industry	Fremont, California



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
Alabama	California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process